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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,282	08/18/2003	Naoki Ito	116373	2441
25944	7590	12/17/2007		
OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850			EXAMINER CHUO, TONY SHENG HSIANG	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 12/17/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/642,282	ITO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Tony Chuo	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12, 23-35, 39, 40, 43, 44, 47-49 and 51 is/are pending in the application.
- 4a) Of the above claim(s) 1-12, 35, 39 and 49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-25, 28, 33, 34, 40, 43, 44, 47, 48 and 51 is/are rejected.
- 7) ☒ Claim(s) 26, 27 and 29-32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/19/07 has been entered.

### ***Response to Amendment***

2. Claims 1-12, 23-35, 39, 40, 43, 44, 47-49, and 51 are currently pending. Claims 1-12, 35, 39, and 49 are withdrawn from further consideration as being drawn to a non-elected invention. Claims 13-22, 36-38, 41, 42, 45, 46, and 50 are cancelled. New claim 51 has been added. The amended claims do overcome the previously stated 102 rejection. In addition, the indicated allowability of claims 28, 33, 44, and 48 is withdrawn in view of the newly discovered reference(s) to Smotkin and Kearl. Rejections based on the newly cited reference(s) follow. Therefore, upon further consideration, claims 23-25, 28, 33, 34, 40, 43, 44, 47, 48, and 51 are rejected under the following new 112, 102, and 103 rejections.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 34 recites the limitation "the coating" in line 2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 23, 28, 33, 34, 40, 43, 47, and 51 are rejected under 35 U.S.C. 102(b) as being anticipated by Smotkin (US 2002/0031695).

Regarding claims 23, 40, and 51, the Smotkin reference discloses a fuel cell and a method of forming a fuel cell comprising the steps of: forming an electrolyte membrane by forming a substrate "D" formed from a dense proton permeable material, and forming an inorganic electrolyte layer "C" on one side of the substrate; an oxygen electrode "B" formed on one side of the electrolyte membrane; a hydrogen electrode "B" formed on the other side of the electrolyte membrane, wherein the substrate is a proton

conductor and is permeable only to hydrogen, and wherein the inorganic electrolyte layer is a proton conductor (See paragraphs [0025],[0080],[0082],[0087],[0103] and Figure 3).

Examiner's note: It is inherent that a fuel cell comprises an oxidizing gas supply portion that supplies an oxidizing gas to the oxygen electrode and a fuel gas supply portion that supplies a hydrogen-rich fuel gas to the hydrogen electrode.

Regarding claims 28 and 33, it also discloses a substrate that is formed from an alloy of vanadium and an electrolyte layer "C" that is formed on the hydrogen side of the substrate "D" (See paragraph [0088] and Figure 3).

Regarding claim 34, it also discloses an electrolyte membrane that is disposed so that the substrate "D" is interposed between the electrolyte layer "C" and the oxygen electrode "B" (See Figure 3).

Regarding claims 43 and 47, it also discloses an inorganic electrolyte layer "C" that is a thin membrane (See paragraph [0149]).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 44 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smotkin (US 2002/0031695) in view of Kearl (US 2002/0155335). The Smotkin reference is applied to claims 23 and 47 for reasons stated above.

However, Smotkin does not expressly teach a thin membrane that has a thickness of 0.1 to 1  $\mu\text{m}$ . The Kearl reference discloses an electrolyte layer for a solid oxide fuel cell that has a thickness ranging from about less than 1 micron to about 20 microns (See paragraph [0039]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Smotkin fuel cell to include a thin membrane that has a thickness of 0.1 to 1  $\mu\text{m}$  in order to maximize the energy density of the fuel cell by minimize the thickness of the electrolyte layer while maintaining enough thickness such that the electrolyte layer has sufficient proton conductivity.

9. Claims 23-25, 34, 40, 43, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al (US 2002/0098404) in view Champion (US 2003/0235753).

The Shibata reference discloses a fuel cell and method of making a fuel cell comprising: an electrolyte membrane comprising an adhering anode layer "31" and a solid electrolyte layer "10" that is an inorganic electrolyte layer formed on one side of the adhering anode layer; an oxygen electrode "22" disposed on one side of the electrolyte membrane; and a hydrogen electrode "32" disposed on the other side of the electrolyte membrane (See paragraph [0030] and Figure 1A).

Examiner's note: It is inherent that a fuel cell comprises an oxidizing gas supply portion that supplies an oxidizing gas to the oxygen electrode and a fuel gas supply portion that supplies a hydrogen-rich fuel gas to the hydrogen electrode. In addition, the adhering anode layer "31" is construed as a substrate formed from a dense hydrogen permeable material. The adhering electrode layers are dense, discontinuous thin film layers which means that all portions of surfaces of individual particles do not necessarily contact others perfectly so that individual particles have portions that do not contact others (See paragraph [0042]). Therefore, hydrogen gas can diffuse through this discontinuous thin film layer. In addition, it also discloses that the adhering anode layer "31" in the fuel electrode "30" is one constituting a three phase interface that is an electrochemical reaction field required for a cell reaction (See paragraph [0032]). This implies that the adhering anode layer permeates the hydrogen in the state of protons or hydrogen atoms.

It also discloses an electrolyte layer "10" that is coated with a cathode adhering layer "21" that is interposed between the electrolyte layer "10" and the oxygen electrode "22" (See Figure 1A). Examiner's note: The cathode adhering layer is construed as a dense hydrogen permeable material.

It also discloses an adhering anode layer that is made of nickel, nickel-chromium alloy, or nickel-iron alloy and a adhering cathode layer that is made of silver, platinum, gold, etc (See paragraphs [0047],[0048]).

It also discloses an inorganic electrolyte layer "10" that is a thin membrane (See paragraph [0046]).

However, Shibata et al does not expressly teach an electrolyte layer that has proton conductivity. The Champion reference discloses electrolyte materials for solid oxide fuel cells such as proton conducting perovskites (See paragraph [0035]).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Champion indicates that proton conducting perovskites are suitable materials for use as electrolyte materials for a solid oxide fuel cell. The selection of a known material based on its suitability for its intended use has generally been held to be *prima facie* obvious (MPEP §2144.07). As such, it would be obvious to use proton conducting perovskites.

#### ***Allowable Subject Matter***

10. Claims 26, 27, and 29-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Shibata reference discloses a fuel cell comprising an electrolyte membrane having a dense hydrogen permeable layer and an inorganic electrolyte layer formed on one side of the dense hydrogen permeable layer. However, Shibata et al does not expressly teach a hydrogen permeable material that includes at least two hydrogen separation membrane layers made of different kinds of metal, and a metal diffusion suppression layer provided on at least a part of a contact interface between the separation membrane layers of the different kinds of metal; a reaction suppression layer, provided on at least a part of an interface between the substrate and the electrolyte layer; an electrolyte layer that is a



composite oxide containing an A-site material having an alkali metal element as a principal component and a B-site material having another element as a principal component such that the molar ratio of the A-site material to the B-site material is smaller than the constant molar ratio.

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 23-25, 34, 40, 43, and 47 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 7:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC



**JONATHAN CREPEAU**  
**PRIMARY EXAMINER**